

What Is Claimed Is:

1. In a power line communication system having a digital/analog conversion unit for converting digital signal into analog signal and transmitting it through a power line, a multiple channel frequency shift keying (FSK) modulating apparatus in the power line communication system comprising:
 - a plurality of modulation units for modulating transmission data of the multiple channel into predetermined frequencies; and
 - 10 a mixing unit for mixing signals of the multiple channel modulated by the modulation units and outputting the resultant signal to a digital/analog conversion unit.
2. The apparatus of claim 1, wherein the plural modulation units are constructed as a 4-ary frequency shift keying(FSK) modulation unit, respectively.
3. In a power line communication system having a power line, an analog amplifying unit, and an analog/digital conversion unit, a demodulating apparatus comprising:
 - a band-pass filtering unit for filtering a multiple channel signal received through the power line, amplified by an analog amplifying unit and then converted into a digital signal by an analog/digital conversion unit to a predetermined band;
 - 25 a sine wave generation unit for generating a plurality of sine waves;

a first multiplying unit for multiplying the multiple channel signal filtered in the band-pass filtering unit by the plurality of sine waves generated from the sine wave generation unit, for thereby outputting the resultant signal;

5 a low pass filtering unit for filtering the multiple channel signal multiplied by the first multiplying unit;

 a correlation unit for correlating the multiple channel signal filtered by the low pass filtering unit with a particular frequency and then outputting the resultant signal;

10 an initial signal detection unit for detecting whether a transmission signal is received from the multiple channel signal outputted after correlating in the correlation unit;

 an automatic gain control unit for detecting a moving average for a predetermined time for the signal outputted from the initial signal detection unit, comparing the same with a predetermined level, and controlling a gain value of the analog amplifying unit so that the multiple channel signal received from the power line can enter a predetermined conversion area of the analog/digital conversion unit, if the moving average according to the result of the comparison is more than the predetermined level;

15 a channel selection unit for analyzing a channel response of the multiple channel signal outputted after correlating in the correlation unit and then selecting a channel having a good channel response;

 a symbol timing restoration unit for restoring symbol timing information of a sending party from the multiple channel signal outputted 25 after correlating in the correlation unit;

an equalization unit for equalizing the maximum value of attenuated frequencies contained in the multiple channel signal outputted after correlating in the correlation unit to a predetermined value; and

5 a data discriminating unit for synchronizing with symbol timing information restored in the symbol timing restoration unit according to the channel selected in the channel selection unit and thereafter discriminating the receiving data by sampling the multiple channel signal from the equalization unit.

10 4. The demodulating apparatus of claim 3, wherein in the sine wave generation unit, a plurality of sine wave values are predetermined for generating a plurality of sine waves corresponding to the multiple channel shift keying (FSK).

15 5. The demodulating apparatus of claim 3, wherein in the low pass filtering unit, a filtering value is predetermined in order to filter a lower one of output values of the first multiplying unit.

20 6. The demodulating apparatus of claim 3, wherein in the correlation unit, a plurality of serial correlators are implemented as a small hardware size.

25 7. The demodulating apparatus of claim 6, wherein particular frequencies of the plurality of serial correlators are predetermined to be identical to the frequency of the low pass filtering value of the low pass

filtering units.

8. The demodulating apparatus of claim 3, wherein the equalization unit comprises a maximum value detection unit for detecting the maximum value of a multiple channel signal outputted after correlating in the correlation unit for a predetermined time, a coefficient determination unit for determining a coefficient according to the maximum value detected from the maximum value detection unit, and a second multiplying unit for multiplying the multiple channel signal outputted after correlating in the correlation unit by the coefficient determined in the coefficient determination unit to output a multiple channel signal having a predetermined maximum value.

9. In a power line communication system having a digital/analog conversion unit for converting digital signal into analog signal and then outputting it through a power line, an analog amplifying unit for amplifying a multiple channel received through the power line as a predetermined level, and an analog/digital conversion unit for converting the analog signal outputted from the analog amplifying unit into the corresponding digital signal, an apparatus for modulating and demodulating a multiple channel frequency shift keying (FSK) in a power line communication system comprising:

a multiple channel frequency shift keying (FSK) modulating apparatus in the power line communication system comprising:

25 a plurality of modulation units for modulating transmission

data of the multiple channel into predetermined frequencies; and

a mixing unit for mixing signals of the multiple channel modulated by the modulation units and outputting the resultant signal to a digital/analog conversion unit;

5 a demodulating apparatus comprising:

a band-pass filtering unit for filtering a multiple channel signal received through the power line, amplified by an analog amplifying unit and then converted into a digital signal by an analog/digital conversion unit to a predetermined band;

10 a sine wave generation unit for generating a plurality of sine waves;

a first multiplying unit for multiplying the multiple channel signal filtered in the band-pass filtering unit by the plurality of sine waves generated from the sine wave generation unit, for thereby outputting the resultant signal;

a low pass filtering unit for filtering the multiple channel signal multiplied by the first multiplying unit;

a correlation unit for correlating the multiple channel signal filtered by the low pass filtering unit with a particular frequency and then
20 outputting the resultant signal;

an initial signal detection unit for detecting whether a transmission signal is received from the multiple channel signal outputted after correlating in the correlation unit;

an automatic gain control unit for detecting a moving average for
25 a predetermined time for the signal outputted from the initial signal

detection unit, comparing the same with a predetermined level, and controlling a gain value of the analog amplifying unit so that the multiple channel signal received from the power line can enter a predetermined conversion area of the analog/digital conversion unit, if the moving average according to the result of the comparison is more than the predetermined level;

a channel selection unit for analyzing a channel response of the multiple channel signal outputted after correlating in the correlation unit and then selecting a channel having a good channel response;

a symbol timing restoration unit for restoring symbol timing information of a sending party from the multiple channel signal outputted after correlating in the correlation unit;

an equalization unit for equalizing the maximum value of attenuated frequencies contained in the multiple channel signal outputted after correlating in the correlation unit to a predetermined value; and

a data discriminating unit for synchronizing with symbol timing information restored in the symbol timing restoration unit according to the channel selected in the channel selection unit and thereafter discriminating the receiving data by sampling the multiple channel signal from the equalization unit.

10. The apparatus of claim 9, wherein the plural modulation units are constructed as a 4-ary frequency shift keying(FSK) modulation unit, respectively.

11. The apparatus of claim 9, wherein in the sine wave generation unit, a plurality of sine wave values are predetermined for generating a plurality of sine waves corresponding to the multiple channel shift keying (FSK).

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12. The apparatus of claim 9, wherein in the low pass filtering unit, a filtering value is predetermined in order to filter a lower one of output values of the first multiplying unit.

10 13. The apparatus of claim 9, wherein in the correlation unit, a plurality of serial correlators are implemented as a small hardware size.

14. The apparatus of claim 13, wherein particular frequencies of the plurality of serial correlators are predetermined to be identical to the
15 frequency of the low pass filtering value of the low pass filtering units.

15. The apparatus of claim 9, wherein the equalization unit comprises a maximum value detection unit for detecting the maximum value of a multiple channel signal outputted after correlating in the correlation
20 unit for a predetermined time, a coefficient determination unit for determining a coefficient according to the maximum value detected from the maximum value detection unit, and a second multiplying unit for multiplying the multiple channel signal outputted after correlating in the correlation unit by the coefficient determined in the coefficient determination unit to output
25 a multiple channel signal having a predetermined maximum value.